ACCOUNTING INNOVATION ANALYSIS FOR THE STOCK PRICES AND MACROECONOMIC FACTORS OF FIVE ASEAN COUNTRIES DURING AND POST THE 1997 ASIAN FINANCIAL CRISIS

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Abstract: This paper seeks to examine some of the dynamic interactions of stock prices and macroeconomic factors in five ASEAN countries, Indonesia; Malaysia; the Philippines; Singapore; and Thailand with particular attention to the 1997 Asian financial crisis and period onwards. Using monthly time series data of the countries, accounting innovation analyses based on vector autoregressive (VAR) analytical framework is employed to empirically examine the interaction among the variables. This research reveals that, firstly, a shock to a particular variable in the model results in various contemporaneous reactions by other variables across the countries during the sample period. Secondly, the general forecast error variance decomposition results likely reinforce the outcomes of the general impulse response analyses in most of the countries.

Keywords: accounting innovation analysis, Asian financial crisis, stock markets, macroeconomic factors, VAR.

Abstrak: *Makalah ini ditujukan untuk mengkaji berbagai interaksi dinamik yang terjadi antara indeks harga saham dan factor-faktor ekonomi makro di kelima negara-negara ASEAN, yaitu Indonesia; Malaysia; Filipina; Singapura; dan Thailand pada saat dan setelah berlangsungnya krisis keuangan Asia tahun 1997. Dengan menggunakan data time series bulanan dari negara-negara tersebut, accounting innovation analysis yang didasarkan atas kerangka analisa vector autoregressive (VAR) diaplikasikan untuk menguji secara empiris interaksi dinamik antara berbagai variabel tersebut. Penelitian ini mengungkapkan bahwa, pertama, suatu goncangan terhadap suatu variabel tertentu di dalam model menghasilkan berbagai reaksi temporer oleh variabel-variabel lainnya di seluruh negara-negara tersebut selama periode penelitian. Kedua, hasil-hasil analisa general forecast error variance decomposition nampaknya cenderung memperkuat hasil-hasil dari analisa general impulse response di sebagian besar negara-negara ASEAN tersebut.*

Kata kunci: *analisa accounting innovation, krisis keuangan Asia, pasar modal, faktor-faktor ekonomi makro, VAR.*

From the 1980s until first half of 1990s, on average, the five ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) enjoyed higher economic growth compared not only with the other members, but also with

the developed countries and the rest of the world (Tongzon 2002:16). Supported by liberalizing of their financial markets during the 1980s, the five ASEAN financial markets being overwhelmed by international capital inflows, mainly in term of bank loan and portfolio investment (DFAT 1999:29), to finance domestic investment and current account deficits in order to raise sustainable economic growth and the standard of living in those countries. As a consequence of these large capital inflows and pegged (as in Thailand and the Philippines) or crawling (as in Indonesia, and Malaysia) exchange rate systems in the pre-crisis period, the banking system grew very rapidly. However, this growth was not supported by strong and adequately-supervised financial systems in each country (Radelet and Sachs 1999b:5).

Initiated by the drop in stock and land prices in Thailand in late 1996 and early 1997, the Thailand's financial institutions weakened. This caused foreign investors to begin withdrawing their funds from the country leading to massive capital outflows. This then worsened the Thai economy and became the triggering factor of the financial crisis. The Bank of Thailand had almost depleted its foreign reserves in order to defend its currency peg to the US dollar (Tongzon 2002:156). By early July 1997, the bank then floated the bath (Radelet et al. 1999b:6). Once the baht was floated, its value depreciated substantially against the US dollar.

What occurred in Thailand, quickly spread out to its ASEAN neighbors such as the Philippines, Malaysia, and Indonesia, which have almost the same characteristics in term of macroeconomic fundamentals. Following Thailand, the countries then altered their exchange rate systems into free-float systems after their central banks failed to continuously defend their currencies value against the US dollar. By October 1997, the four ASEAN countries (Indonesia, Malaysia, Thailand, and the Philippines) were in a full-fledged financial panic (Radelet et al. 1999b:6). This forced Thailand, the Philippines and then Indonesia to seek assistance from International Monetary Fund (IMF). However, the announcement of this action did not immediately cease international capital outflows from those countries. The consequences of this regional financial chaos are: (1) economic growth rate dramatically declined in the four ASEAN countries in 1998. Indonesia experienced the worst condition in that year (Tongzon 2002:16). (2) domestic interest rate sharply rose. This was one of several short run prescriptions recommended by the IMF during its involvement in those countries (Fisher 1998:5) (3) inflation rate rocketed up to 70% in Indonesia, and on average 24% in the four ASEAN countries after a year crisis (IFS 2004) (4) during the 1997 crisis, the ASEAN regional stock price indices and banking funds dramatically declined (DFAT, 1999:23, 27). The rush in the stock markets following the rush in other financial markets were mostly caused by negative market sentiment, higher investment risks, and financial panic (Radelet and Sachs, 1999a: 3-5).

However, the downturn in the five ASEAN rebounded in 1999. After the sharp output contraction in 1998, growth returned in that year as depreciated currencies spurred higher exports (Krugman and Obstfeld 2003:693). A free-floating exchange rate system, implemented in Indonesia, the Philippines and Thailand, is also considered to be capable of providing better protection for the

domestic economy against external trade shocks and helping to more effectively transmit monetary policy (DFAT 1999:37).

During 1999, all of the five ASEAN's currencies experienced an appreciation against the US dollar after the sharp depreciation in 1998. Following the appreciation in domestic currencies, the rate of inflation also lowered in the five ASEAN countries. At the end of 1999, all of the five ASEAN's interest rates declined, and were even lower than those before the financial crisis (IFS, 2004). In the subsequent years, the monetary authorities of the countries kept targeting lower domestic interest rates. The year of 1999 also became a turning point for the five ASEAN's stock markets. By the end of 2003, the economies of the five ASEAN were better off.

From the facts above, it seems that the crisis began in one country and then spread out to others through financial and capital markets, and eventually affected the countries' macroeconomic variables. This pattern indicates that there are dynamic interactions not only among the ASEAN capital markets, but also between capital market and macroeconomic factors within a country. Hence, this paper seeks to reveal some of those dynamic interactions through an empirical examination on some economic and financial variables related to this issue. By using accounting innovation analysis, this study will empirically examine the dynamic interaction between stock markets and macroeconomic factors in the countries during and after the crisis period.

THE RELATIONSHIP AMONG MACROECONOMIC FACTORS

The Mundell-Fleming Model provides the simple explanation of the linkage between the financial system and macroeconomic factors. The general equilibrium of Mundell-Fleming Model links the internal and external balances of an economy. Even though there are some limitations in the model, the major contribution of this model is to incorporate international capital movements into a formal macroeconomic model based on the Keynesian IS-LM framework.

Considering the limitations of Mundell-Fleming Model, monetarists developed some alternative approaches to explain the linkage of the financial system to economic factors. The famous one is the Dornbush Sticky-Price Model. This model assumes that uncovered interest parity holds and that domestic prices are sticky in the short run (Pilbeam 1998:168). According to this model, a monetary expansion, such as an increase in the domestic money supply, without immediate respond in the real sector (i.e. increase in domestic prices), will create an excess money supply, and then decrease the domestic interest rate in the short run. The decline in the interest rate will cause the domestic currency to jump-depreciate immediately, overshooting its long run equilibrium, since foreign exchange speculators expect an appreciation of domestic currency to compensate the lower interest rate. However, as the domestic prices gradually increase and arrive at their new long run equilibrium, the interest rate will rise back to its previous level and the domestic currency will be at its long run equilibrium.

The Exchange Rate and Interest Rate

The International Fisher Effect explains that currencies with low interest rates are expected to appreciate relative to those with high interest rates (Shapiro 2004:214). Although considerable short-run deviations occur, empirical tests lend some support to the relationship postulated by the International Fisher Effect. For example, Beng and Ying (2000: 95) report that the relationship between the real exchange rate and the real interest rate differential are fairly robust in the long run, which indicates the existence of long run stable adjustment dynamics in Malaysia.

Exchange Rate and Inflation

According to the relative version of the Purchasing Power Parity (PPP), if a country's inflation rate is higher (lower) than that of another in the same time, then the country's exchange rate will depreciate (appreciate). However, if there are deviations from the PPP, it will affect the international competitive positions of countries (Eun and Resnick 2004:108). Inversely, a depreciation of the domestic currency may also cause a higher inflation rate in the country, since it will raise the price of imported goods.

Growth and Exchange Rate

As Eun et al. (2004:109) mention, if the exchange rate of a country's currency is undervalued, this will raise the competitiveness of and then demand for the country's exported goods in international markets. It then will stimulate higher domestic production of the goods in the country in order to meet their higher export demand. Furthermore, assuming that the production capacity of the country has not been fully employed, this will increase the production of goods in the country leading to an increase in its economic growth rate.

Growth and Inflation

Inflation may have a negative impact on economic growth through the investment channel. Thus, high inflation will increase the uncertainty about the future returns from investments (Taylor and Moosa 1998:262). Moreover, Chatrath, Ramchander and Song (1997:444) note that, in the case of India, increases in the growth rate have lead to the decline in inflation rate rather than vice versa.

THE RELATIONSHIP BETWEEN MARKETS AND MACROECONOMIC FACTORS

Fama (1981:563) reveals that common share returns are correlated with some macroeconomic factors of a country, such as money supply, inflation, interest rate, and capital expenditure. Furthermore, the type of relationships between stock market returns and macroeconomic factors can be varied.

In the short term, the correlation between output growth and lagged stock returns is significant and fairly robust in both emerging and advance economies in yearly data, and somewhat lower in quarterly data (Mauro 2003:129). This

suggests that developments in stock prices should be taken into account in forecasting output. However, it should also be considered that the relationship between stock returns and economic growth has not been stable over time (Stock and Watson 1990, 1998).

The dynamic interaction between stock prices and economic activity is not only limited to the interaction between stock price and economic growth. Abdullah and Hayworth (1993:50) argue that stock returns are positively related to inflation and growth of the domestic money supply in the U.S, but negatively related to short and long-term interest rate. Other researchers (Leonard and Solt 1987; Giovanini and Jorion 1987; Kaul and Seyhun 1990; Randal and Suk, 1999) also support the significant relationship between inflation or expected inflation and stock market prices.

In terms of the interaction between stock market returns and exchange rate, Johnson and Soenen (1998:1-2) state depreciation may cause a negative impact on stock price. Morley and Pentecost (2000:10) also confirm that stock markets and exchange rates are linked through a common cyclical pattern.

For the Asia-Pacific region, Ibrahim (2000:36,45), who observed the Malaysian exchange rate, found cointegration when the M2 measure of money supply and reserves are included, but no long-run relationship between the exchange rate and stock prices was found using bivariate models. Wongbangpo and Sharma (2002:27) also report that individual stock markets dynamically interact with macroeconomic factors and regional stock prices movements in the short and long run in Thailand; Indonesia; Malaysia; Singapore; and the Philippines before the 1997 Asian financial crisis. However, in some cases, macroeconomic factors cannot be reliable indicators for stock market prices movement in the Asian markets because of the inability of stock markets to fully capture information about the change in macroeconomic fundamentals (Fung and Lie 1990, as is cited in Wongbangpo et al. 2002:29).

There are two points that may be drawn form the literature review. Firstly, macroeconomic factors (i.e. economic growth, inflation, interest rate, and exchange rate) of a country are interacted to each other both in the short term and long term. Secondly, stock price movements are, either symmetrically or asymmetrically, interacted to macroeconomic factors. In some cases, cointegration vectors and short run causal linkages between stock price movement and macroeconomic factors are also appear. It is also worth noting that the relationship between the stock market movement and macroeconomic factors may not be direct, consistent, and stable over time.

HYPOTESES

Some hypotheses that can be stated regarding the literature review are: (1) macroeconomic variables of a country interact to each other in various fashions. Thus, a shock to one of the variables will result in contemporaneous reaction by the others. (2) since the equity market is believed to act as funding source, equity markets may be key institutions in promoting economic activity (Rousseau and Wachtel 2000:1955). Furthermore, some experts (Mahdavi and Sohrabian 1991; Mukherjee and Naka 1995; Wongbangpo et al. 2002) report the interaction between the stock market and economic growth. Therefore, it can be hypothesized that movements in a country's stock price index has interaction with the country's

economic growth (3) the stock market and the level of prices are interacted to each other (Beenstock and Chan, 1988; Abdullah et al, 1993). Even though it is found to be positive in some cases (Abdullah et Al. 1993:50), the interaction between stock markets and inflation is generally in negative fashion (Fama 1981; Saunders and Tress 1981; Wongbangpo et al. 2002). Hence, it is hypothesized that the stock index will be negatively interacted with the CPI of each country. (4) banks' interest rate has negative effect on stock market price index (Arestis and Luintel 2001; Wongbangpo et al., 2002). These both arguments confirm other previous research' findings (Abdullah et al. 1993). Therefore, the hypothesis that can be drawn is that, for each country, stock price index has a negative interaction with interest rates. (5) even though the interaction between stock index and exchange rate could be either positive (Solnik 1987; Mukerjee et al. 1995; Wongbangpo et al. 2002) or negative (Johnson et al. 1998), From the foreign shareholders point of view, the decrease in firms' profits and in shares values will motivate them to take a short position. Therefore, it is more reasonable to hypothesize that the stock index of a country has negative interaction with its exchange rate during the observation period.

RESEARCH METHODOLOGY

This research use five variables, they are: (1) Stock Market Price Index. In this paper, the closing stock prices index of the last day of trading in each month of the five ASEAN's stock market, which are IHSG of Indonesia; KLSE of Malaysia; PSE of the Philippines; STI of Singapore; and SET Composite of Thailand, will be employed as measurement of the countries' monthly stock market price movements (2) Economic Growth. As Jackson and McIver (2004:515) state economic growth is the increase in real GDP or real GDP per capita that occurs over the long-term. Quarterly indices of GDP volume with 1995 as a base year of the five ASEAN are used in this paper to reflect domestic economic growth of the countries for every three months. The quarterly indices of the GDP will then be interpolated to obtain the monthly indices of GDP. The interpolation method used is the one introduced by Chow and Lin (1971:372-5) (3) Inflation Rate. The percentage change of Consumer Price Index (CPI) is commonly used as one of several indicators to measure the country's inflation rate, which is a continuous and ongoing increase in the overall or aggregate price level of an economy (Kniest et al. 1998:156). Therefore, the monthly CPI of the five ASEAN will be applied as an indicator of the level of price movements in the real sector of the economies during the observation period in this paper (4) Interest Rate. Interest rate is the amount that lenders charge when they lend money, expressed as a percent of the amount loaned (Taylor et al. 1998:119). On the other hand, interest rates also can be considered as the cost for borrowing money. There are several types of interest rates, however money market or interbank interest rate will be used as indicator of short-term domestic interest rate in this paper and (5) Exchange Rate. The exchange rate is the price of one nation's currency in term of another (Shapiro 2002:33). This study employs the end of month direct quote of nominal spot exchange rates of the five ASEAN's currencies against the US dollar.

The monthly data of spot exchange rate of all the five ASEAN's currencies; monthly interest rate; and Consumer Price Index data are obtained from International Financial Statistic (IFS) Online. All monthly stock market index

data of the five ASEAN are collected from the Capital Market Supervisory Agency (BAPEPAM) website.

However, since the IFS Online does not provide all data for the index of GDP volume (1995=100) for whole observation period, the data are also collected from the Central Bank of Indonesia website, Statistics Singapore website, and National Statistical Coordination Board, with some based-year adjustments.

In order to examine the hypotheses, suitable econometric models are required. Since the objective of this paper is to examine the dynamic relationships of several variables, VAR or VECM might be suitable to be used. The examination procedures conducted in this paper is that; firstly, unit root test at the levels and first differences would be conducted to determine whether each variable is stationary or non-stationary. Secondly, the Engle-Granger residual-based test will test the existence of co integration among the variables for each country. Finally, if a co integration relationship does not exist, VAR analysis in first difference will be applied and then continued with accounting innovation analysis. However, if the variables are co integrated, the analysis will continue in a co integration analytical framework.

ANALYSIS AND DISCUSSION

Before conducting all the analyses, the real GDP index, CPI, and the stock price index of all countries were transformed into log forms. Hence, the notation used is LGDP, LCPI, and LSP representing of log of real GDP index, log of CPI, and log of stock price index, respectively. Exchange rates and interest rates are already in rate forms, therefore not transformed to log. The exchange rate and interest rate variables will be given the notation ER and IR, respectively. Microfit 4.0 was used to conduct all statistical analyses in this paper.

Table 1. The Unit Root Test Results

Countries	Variables	ADF at level	ADF at 1ST difference
Indonesia	ER	Reject Ho	Reject Ho
	IR	Reject Ho	Reject Ho
	LSP	Fail to reject Ho	Reject Ho
	LCPI	Reject Ho	Reject Ho
	LGDP	Fail to reject Ho	Reject Ho
Malaysia	ER	Reject Ho	Reject Ho
	IR	Reject Ho	Reject Ho
	LSP	Fail to reject Ho	Reject Ho
	LCPI	Fail to reject Ho	Reject Ho
	LGDP	Fail to reject Ho	Reject Ho
Thailand	ER	Fail to reject Ho	Reject Ho
	IR	Reject Ho	Reject Ho
	LSP	Fail to reject Ho	Reject Ho
	LCPI	Fail to reject Ho	Reject Ho
	LGDP	Reject Ho	Reject Ho
Singapore	ER	Fail to reject Ho	Reject Ho
	IR	Reject Ho	Reject Ho
	LSP	Fail to reject Ho	Reject Ho
	LCPI	Fail to reject Ho	Reject Ho

	LGDP	Fail to reject Ho	Reject Ho
Philippines	ER	Fail to reject Ho	Reject Ho
	IR	Fail to reject Ho	Reject Ho
	LSP	Fail to reject Ho	Reject Ho
	LCPI	Fail to reject Ho	Reject Ho
	LGDP	Reject Ho	Reject Ho

(Source: calculated by the author)

The objective of the unit root test is to empirically examine whether a series contains a unit root. If the series contains a unit root, this means that the series is non-stationary. Otherwise, the series will be categorized as stationary. The common method to test the present of unit root is the Dickey-Fuller or Augmented Dickey-Fuller test (ADF test).

Table 1 reports the conclusion of ADF test results for all series (with 95 % confidence interval, the critical values of ADF statistic are –2.9055 for including intercept but not a trend and –3.4779 for including intercept and a linear trend). The table clearly shows that there are some rejections of H_0 in the series at levels. However, the majority of the series can be concluded as non-stationary, since their ADF test results fail to reject the null hypothesis. Therefore, it is necessary to continue ADF test for all series in first difference. The results of this second test are that all series are now stationary.

Based only on the results of ADF test, it cannot still be conclude that a VAR in first difference can be applied in this study, rather than a co integration analysis framework. The reason is that a VAR in first difference is the correct specification if all variables are not co integrated (Enders 2004:287). Therefore, in order to examine the existence of co integration among the variables, Engle-Granger residual-based test will be conducted for each country's equation model.

After estimating one model of each country using OLS with LSP as the dependent variable of each equation at level, the residuals were tested using Engle-Granger residual-based test using a 5% significance level and five variables. Finally, it is found that all of the residual tests fail to reject the null hypothesis (the critical value for the Engle-Granger co integration test at 5% significant level, 5 variables, and 78 observations is - 4.557), meaning that there is no co integration among the variables within any of the countries. Since there is no co integration relationship among variables of each country, VAR in first difference model will be used in this paper.

Since this study covers both during and after the crisis period, a dummy variable will be required to distinguish the both periods to prevent a bias statistical result. The 1997 Asian financial crisis started in July 1997 for every country in the region. However, the ending period of the crisis was not the same for each of those countries. Some researchers argue that the crisis was over in 1999 (Radelet et al. 1999b; DFAT, 1999; Krugman et al. 2003), however they do not mention in what month that the crisis ended for each country.

It is hard and subjective to determine when the beginning of the post-crisis period started. Therefore, to overcome this issue, some criteria have to be developed, which are: (1) the stock price index and the index of real GDP start to steadily grow, or at least their fluctuation is in a range close to that of before the

crisis (2) the inflation rate starts to decline to its pre-crisis rates. (3) the domestic exchange rates start to appreciate to a new equilibrium and do not widely fluctuate any more (4) domestic interest rates start to decline to at least the same rates as those before the crisis

Based on those criteria, it may be stated that the ending period of the crisis for Singapore is September 1998; the Philippines is February 1999; Malaysia is May 1999; Thailand is June 1999; and Indonesia is November 1999. It is worth noting that although Singapore did not directly suffer from domestic currency exchange rate crisis, the Asian financial crisis in fact moderately affected Singapore's domestic financial market; stock market; and other macroeconomic factors. Because of the limitations of likelihood ratio test (Enders 2004:283), multivariate generalization of AIC and SBC become the most suitable alternatives for this study. The minimum values of AIC and/or SBC may validly indicate the appropriate lags length, as long as the model's residual has no serial correlation problem. The appropriate lag lengths are reported in Table 2.

Table 2. Countries' Lag Length

Country	Lag Length
Indonesia	4
Malaysia	3
The Philippines	4
Singapore	3
Thailand	2

(Source: calculated by the author)

Since VARs are a-theoretical, their results are often difficult to interpret. Thus, to overcome these difficulties, it is often recommended to conduct accounting innovation analysis, which contains impulse responses and forecast error variance decomposition analysis. These analyses can be useful to examine the short run dynamic interactions among variables. Although to some extent, these both analyses provide very similar information.

Impulse response analysis traces out the responsiveness of dependent variables in the VAR to shocks in each of the variables (Brooks, 2002:341). It also can be stated that a shock to one dependent variable results in contemporaneous reaction by other variables. Impulse responses are obtained from the moving average representation of the VAR. A unit shock is applied to the error and its effects are noted. By doing this, we can examine the length size of a shock to a given equation on all variables in the system.

Forecast error variance decomposition analysis gives the proportion of movements in a sequence due to its own shocks versus shocks to the other variables (Enders, 2004:280). This analysis is done by determining how much of the s-step (s = 1,2,…..n) ahead forecast error variance for each variable is explained by the innovation in each explanatory variable (Brooks 2002:342).

It has been common practice in econometrics to carry the analysis using orthogonalized VAR innovations so that they are not contemporaneously

correlated. However, accounting innovation analysis based on the Choleski factorization is sensitive to the variables ordering when the residual covariance matrix is non-diagonal (Yang, Kolari, and Min 2003:479). In a comparative study of the traditional orthogonal zed and generalized VAR analysis, Dekker, Sen and Young (2001:31) found that the generalized approach provided more accurate results than the traditional orthogonal zed approach for both impulse response and forecast error variance decomposition analysis. Therefore, the generalized impulse response and forecast error variance decomposition analysis are applied in this study.

Table 3. Generalized Impulse Response Analysis for Indonesia

Shock To :	Time Horizon	Contemporaneous effect on : DLSP	DER	DIR	DLCPI	DLGDP
DLSP	0	0.0986	14.6696	-0.2206	-0.0013	-0.0008
	1	0.0175	-	0.9078	0.0023	0.0014
	12	-0.0044	122.612	- 0.1018	0.0005	0.0028
	24	-0.0074	9	-0.0092	-0.0001	0.0000
			15.3140			
			-4.7882			
DER	0	0.0013	1115.60	1.8868	0.0049	0.0089
	1	-0.0067	00	1.3392	0.0125	-0.0043
	12	0.0021	77.8319	0.0459	0.0014	-0.0007
	24	-0.0004	16.3677	0.0169	-0.0003	0.0000
			0.7503			
DIR	0	-0.0045	437.490	4.8112	0.0056	-0.0020
	1	-0.0111	0	-2.3123	0.0070	0.0067
	12	-0.0002	99.5876	0.1781	0.0008	-0.0004
	24	-0.0004	-0.6841	-0.0048	0.0000	0.0000
			0.6371			
DLCPI	0	-0.0131	557.790	2.7359	0.0099	0.0024
	1	-0.0182	4	-0.8506	0.0105	0.0004
	12	0.0004	139.873	0.1780	0.0014	-0.0006
	24	-0.0004	0	0.0072	0.0002	0.0000
			3.1422			
			1.0820			
DLGDP	0	-0.0035	437.967	-0.4244	0.0011	0.0227
	1	0.0007	6	0.8402	0.0021	-0.0049
	12	-0.0007	-	0.0576	0.0003	0.0000
	24	0.0000	109.416	0.0084	0.0000	0.0000
			5			
			6.7207			
			-0.7735			

(Source: calculated by the author)

As can be seen in Table 3, a generalised impulse response analysis for the stock index returns in the Indonesia's equation indicates that one standard error

shock to the variable (DLSP) would result in a negative response by changes in the domestic interest rates (DIR) of 0.22%, immediately. After one step ahead, the response changes form negative into a positive sign. The changes in the domestic exchange rate positively responds by Rp.14.67/US$ to this shock immediately, but the response then changes into a negative by Rp.122.61/US$ after one period. The changes in the exchange rates would immediately respond to a one standard error shock to itself by a change of around Rp.1115.60/US$, but then decrease to Rp.77.83/US$ in the subsequence horizon. The effect of the shock would keep resulting in contemporaneous reaction for nearly two years. Other macroeconomic factors and stock index returns also positively responded to shocks in the changes in the domestic exchange rate variable at zero horizon.

A shock to the inflation rate results in the second greatest contemporaneous reaction by changes in the domestic rate (2.74%) after its (DIR) own shocks. This means that, compared with shocks to the changes in the domestic exchange rate variable, a shock to the inflation rate has a more immediate influence on changes in the domestic interest rate.

Table 4. Generalized Impulse Response Analysis for Malaysia

Shock	Time	Contemporaneous effect on :			
To :	Horizon	DLSP	DIR	DLCPI	DLGDP
DLSP	0	0.0806	-0.0920	0.0004	0.0073
	1	0.0169	0.0470	0.0004	-0.0054
	12	-0.0011	0.0114	0.0000	0.0002
	24	-0.0001	0.0022	0.0000	0.0001
DER	0	-0.0104	0.1066	0.0005	-0.0296
	1	0.0226	0.0744	0.0008	0.0111
	12	0.0000	-0.0062	0.0000	-0.0008
	24	0.0000	-0.0017	0.0000	-0.0001
DIR	0	-0.0228	0.3254	0.0007	-0.0061
	1	0.0014	0.0380	-0.0003	0.0025
	12	0.0002	0.0042	0.0000	0.0004
	24	0.0000	0.0008	0.0000	0.0000
DLCPI	0	0.0112	0.0792	0.0027	-0.0034
	1	0.0142	0.1392	0.0001	-0.0036
	12	0.0004	-0.0101	0.0000	-0.0008
	24	0.0000	-0.0021	0.0000	0.0001
DLGDP	0	0.0152	-0.0519	-0.0002	0.0384
	1	-0.0245	-0.0591	-0.0008	-0.0187
	12	-0.0007	0.0215	0.0000	0.0017
	24	-0.0002	0.0049	0.0000	0.0002

(Source: calculate by the author)

Note: Since the Malaysian exchange rate changed from managed floating to fixed in September 1998, no impulse responses are shown for this variable.

Table 4 shows the results of the generalized impulse response for each variable in Malaysian equation. It seems that a shock to any of variables results in

a response by the inflation rate for less than one-year. Stock index returns show the greatest immediate response to a shock in the changes in the domestic interest rate (DIR) variable as compared to a shock in any of the other macroeconomic factors. In the case of the Philippines, Table 5 shows that the inflation rate hardly responds to a shock in any of the other variables, and the responses die in less than a year. Moreover, a shock to the changes in the domestic interest rate does not seem to generate a response by the inflation rate at any horizon. A one standard error shock to stock index returns resulted in an immediate negative reaction by the change in the domestic exchange rate of Peso 0.71 /US$. This reaction seems to result in volatile rates in the following three years.

With the exception of the changes in the domestic exchange rate and of the changes in the domestic interest rate, a shock to stock index returns results in a contemporaneous reaction of the other variables lasting about one year. A shock to stock index returns resulted in a longer reaction by the change in the domestic exchange rate and the changes in the domestic interest rate than by the other variables. Like the Philippines, Singapore's inflation rate shows a shorter response to a shock to most other variables (Table 6).

Table 5. Generalized Impulse Response Analysis for the Philippines

Shock To :	Time Horizon	Contemporaneous effect on : DLSP	DER	DIR	DLCPI	DLGDP
DLSP	0	0.0949	-0.7120	-0.2841	0.0005	-0.0015
	1	0.0280	-0.2218	-0.2185	-0.0005	-0.0035
	12	0.0004	-0.0111	0.0015	0.0000	-0.0004
	24	0.0000	-0.0015	0.0005	0.0000	0.0000
DER	0	-0.0487	1.3853	0.3511	0.0008	0.0051
	1	-0.0053	-0.1184	0.2275	0.0005	0.0068
	12	-0.0003	0.0171	0.0014	0.0000	0.0010
	24	0.0000	0.0013	0.0000	0.0000	0.0001
DIR	0	-0.0374	0.6749	0.7207	0.0000	0.0135
	1	-0.0025	-0.1313	0.2519	0.0000	0.0008
	12	-0.0002	0.0101	0.0008	0.0000	0.0011
	24	-0.0001	0.0011	-0.0001	0.0000	0.0001
DLCPI	0	0.0121	0.2650	-0.0065	0.0040	-0.0013
	1	-0.0006	0.1310	0.0313	-0.0008	0.0027
	12	0.0004	0.0045	0.0060	0.0001	0.0003
	24	0.0000	0.0000	0.0010	0.0000	0.0001
DLGDP	0	-0.0035	0.1725	0.2376	-0.0001	0.0409
	1	0.0111	-0.0453	0.0386	-0.0001	0.0034
	12	-0.0016	0.0266	0.0099	-0.0001	0.0044
	24	-0.0003	0.0047	0.0013	0.0000	0.0006

Source: calculated by the author

Table 6. Generalized Impulse Response Analysis for Singapore

Shock to :	Time Horizon	Contemporaneous effect on : DLSP	DER	DIR	DLCPI	DLGDP
DLSP	0	0.0814	-0.0146	-0.2780	-0.0003	-0.0062
	1	0.0014	0.0058	0.0602	.0.0001	0.0094

	12	-0.0003	0.0004	0.0058	0.0000	0.0002
	24	0.0000	0.0000	0.0002	0.0000	0.0000
DER	0	-0.0343	0.0346	0.3103	0.0001	0.0183
	1	0.0046	-0.0022	0.0370	0.0003	0.0008
	12	-0.0002	-0.0003	-0.0124	0.0000	-0.0002
	24	-0.0001	0.0000	0.0001	0.0000	0.0000
DIR	0	-0.0386	0.0183	0.5866	0.0001	0.0112
	1	-0.0123	0.0030	0.0981	0.0001	0.0076
	12	0.0004	-0.0007	-0.0139	0.0000	-0.0005
	24	0.0000	0.0000	0.0000	0.0000	0.0000
DLCPI	0	-0.0107	0.0012	0.0277	0.0026	0.0040
	1	-0.0210	0.0017	0.0752	-0.0002	-0.0031
	12	0.0004	-0.0002	0.0027	0.0000	-0.0002
	24	0.0000	0.0000	-0.0003	0.0000	0.0000
DLGDP	0	-0.0158	0.0199	0.2060	0.0003	0.0320
	1	0.0021	-0.0020	0.0699	0.0004	0.0005
	12	-0.0005	0.0002	-0.0048	0.0000	0.0003
	24	0.0000	0.0000	0.0003	0.0000	0.0000

(Source: calculated by the author)

A shock to the changes in the domestic exchange rate (DER) caused an immediate negative reaction by the stock index returns, but a positive reaction after one month. Unlike DER, a shock to the change in the domestic interest rate variable resulted in negative reaction by stock index returns in one step ahead. However, the largest and continuous reaction to a shock in stock index returns is given by the change in the domestic interest rate variable.

Table 7 presents the results of the impulse response analysis for Thailand. It can be seen that a shock to the change in the domestic exchange rate variable (DER) causes a 0.48% negative change in the domestic interest rate immediately, and the percentage would increase to 0.96% in the following period. It takes around one-year to fade away. However, a shock to DER results in a negative and immediate response by stock index returns of –0.0525%, and –0.0013% in a month. These results indicate that shocks to DER have more influence on the changes in the domestic interest rate than on stock index returns.

Overall, the Thai's inflation rate and GDP growth rate absorbed shocks to other variables faster than the other countries.

Table 7. Generalized Impulse Response Analysis for Thailand

Shock	**Time**	**Contemporaneous effect on :**				
to :	**Horizon**	**DLSP**	**DER**	**DIR**	**DLCPI**	**DLGDP**
DLSP	0	0.1086	-0.8187	0.3934	-0.0002	0.0030
	1	0.0092	-0.4097	-0.0373	-0.0005	-0.0081
	12	0.0000	0.0004	-0.0008	0.0000	0.0000
	24	0.0000	0.0000	0.0000	0.0000	0.0000
DER	0	-0.0525	1.6921	-0.4841	-0.0001	0.0068
	1	-0.0013	0.4859	0.9602	0.0008	0.0053
	12	-0.0001	0.0021	0.0008	0.0000	0.0000

	24	0.0000	0.0000	0.0000	0.0000	0.0000
DIR	0	0.0249	-0.4772	1.7165	0.0009	-0.0060
	1	0.0025	-0.9946	-0.8841	0.0001	-0.0150
	12	0.0001	-0.0014	-0.0008	0.0000	0.0000
	24	0.0000	0.0000	0.0000	0.0000	0.0000
DLCPI	0	-0.0069	-0.0566	0.4609	0.0034	-0.0059
	1	-0.0246	-0.3753	-0.2158	0.0009	-0.0045
	12	-0.0008	0.0002	0.0001	0.0000	0.0000
	24	0.0000	0.0000	0.0000	0.0000	0.0000
DLGDP	0	0.0111	0.3925	-0.3469	-0.0007	0.0294
	1	0.0119	0.1360	0.6883	-0.0002	0.0009
	12	0.0000	0.0015	0.0005	0.0000	0.0000
	24	0.0000	0.0000	0.0000	0.0000	0.0000

(Source: calculated by the author)

The interpretation of the results of the forecast error variance decomposition is presented by country for selected horizon, and the values shown in the body of the tables are the percentage amount of the forecast error variance of a variable (X) equals the proportion of the forecast error variance of X due to an innovation in variable (Y) divided by the total proportion of the forecast error variance of all variables, including variable X.

In Indonesia, 93.43% of the forecast error variance of the country's stock index returns is attributable to own shocks in the first step ahead. However, an innovation in the country's stock index returns results in 0.43% error variance in the changes in the exchange rate after one month (Table 8).

A shock to the exchange rate causes a 62.48% forecast error variance to its own values after a month, and the percentage decreases in the subsequent periods. An innovation in the changes in the domestic exchange rate variable (DER) results in 10.06% and 16.52% of the error variances of the changes in the domestic interest rate and the inflation rate after a month. On the other hand, 37.52% of the error variance of DER variable is attributable to an innovation in the inflation rate in the same period.

Table 8. Generalized Forecast Error Variance Decomposition Analysis for Indonesia

Innovation	**Step**	**Forecast Error Variance in :**				
In:	**Ahead**	**DLSP**	**DER**	**DIR**	**DLCPI**	**DLGDP**
DLSP	0	97.91%	0.02%	0.21%	1.74%	0.12%
	1	93.43%	0.43%	1.33%	4.69%	0.12%
	6	78.73%	7.36%	4.27%	6.95%	2.69%
	12	75.96%	7.72%	5.27%	7.63%	3.42%
DER	0	0.01%	64.18%	9.87%	16.05%	9.89%
	1	0.76%	62.48%	10.06%	16.52%	10.18%

	6	6.24%	51.50%	16.79%	16.50%	8.97%
	12	10.36%	48.88%	16.15%	15.88%	8.72%
DIR	0	0.14%	10.34%	67.24%	21.75%	0.52%
	1	1.99%	12.21%	65.04%	18.73%	2.02%
	6	13.76%	15.14%	46.72%	20.50%	3.88%
	12	14.55%	15.21%	45.91%	20.23%	4.11%
DLCPI	0	1.11%	15.60%	20.17%	62.39%	0.72%
	1	1.43%	37.52%	16.73%	43.14%	1.18%
	6	6.91%	40.17%	12.31%	39.04%	1.57%
	12	7.53%	40.30%	11.81%	38.69%	1.66%
DLGDP	0	0.10%	13.12%	0.66%	0.99%	85.13%
	1	0.36%	14.07%	7.06%	0.90%	77.61%
	6	9.08%	15.24%	17.00%	10.17%	48.51%
	12	10.31%	15.25%	17.19%	10.58%	46.67%

(Source: calculated by the author)

The forecast error variance of the Malaysian stock index returns (Table 9) is mainly due to its own shocks. Second to its own shocks, an innovation in the changes in the domestic interest rate variable causes the greatest percentage of the error variance of the stock index returns. This result seems to reinforce the result of impulse response analysis that the country's interest rate is the most influential macroeconomic factor in the Malaysia' stock index returns in the short term.

Table 9. Generalized Forecast Error Variance Decomposition Analysis for Malaysia

Innovation	Step	Forecast Error Variance on :			
In:	Ahead	DLSP	DIR	DLCPI	DLGDP
DLSP	0	88.11%	7.04%	1.71%	3.14%
	1	80.14%	6.15%	3.87%	9.83%
	6	72.00%	7.58%	10.50%	9.92%
	12	71.47%	7.50%	10.65%	10.37%
DER	0	2.24%	14.38%	3.78%	79.61%
	1	2.33%	7.18%	1.98%	88.51%
	6	7.53%	10.80%	3.27%	78.40%
	12	8.03%	10.55%	4.41%	77.01%
DIR	0	6.86%	85.87%	5.09%	2.18%
	1	7.24%	71.55%	17.09%	4.12%
	6	9.46%	51.56%	15.77%	23.21%
	12	10.11%	48.25%	15.48%	26.16%

DLCPI	0	1.79%	5.46%	92.02%	0.74%
	1	3.36%	6.20%	82.77%	7.67%
	6	7.49%	9.36%	74.28%	8.87%
	12	7.52%	9.37%	74.08%	9.03%
DLGDP	0	3.33%	2.38%	0.75%	93.55%
	1	4.14%	2.21%	1.25%	92.39%
	6	8.37%	4.63%	5.81%	81.19%
	12	8.49%	4.62%	6.37%	80.51%

(Source: calculated by the author)

As can be seen in Table 10, 70.54% of the error variance of stock index returns of the Philippines is attributable to own shocks in the first step ahead, while only changes in the domestic exchange rate (17.29%) and changes in the domestic interest rate (10.13%) have some additional influence.

The smallest percentage of the forecast error variance of the inflation rate for all horizons is that due to shocks to the changes in the domestic interest rate variable (DIR). For example, an innovation in DIR variable only contributes about 0.11% to the forecast error variance of the inflation rate after one month. This seems to reinforce the result of impulse response analysis that a shock to DIR is unlikely to be significant in forecasting inflation rate at all horizons.

Table 10. Generalized Forecast Error Variance Decomposition Analysis For The Philippines

Innovation	Step	Forecast Error Variance on :				
In:	Ahead	DLSP	DER	DIR	DLCPI	DLGDP
DLSP	0	69.62%	18.34%	10.82%	1.13%	0.10%
	1	70.54%	17.29%	10.13%	1.06%	0.98%
	6	65.64%	17.07%	9.73%	6.25%	1.31%
	12	65.47%	17.12%	9.73%	6.26%	1.42%
DER	0	16.96%	64.40%	15.28%	2.36%	1.00%
	1	18.01%	62.77%	15.35%	2.84%	1.04%
	6	18.95%	60.23%	15.54%	3.70%	1.57%
	12	18.89%	59.96%	15.48%	3.71%	1.96%
DIR	0	10.35%	15.80%	66.60%	0.01%	7.24%
	1	13.58%	18.52%	61.66%	0.11%	6.13%
	6	14.11%	18.24%	56.69%	3.32%	7.64%
	12	14.14%	18.21%	56.58%	3.36%	7.70%
DLCPI	0	1.54%	3.47%	0.01%	94.89%	0.09%
	1	2.78%	4.48%	1.02%	91.61%	0.11%
	6	3.62%	10.03%	2.96%	79.12%	4.26%
	12	3.87%	9.97%	3.00%	78.43%	4.72%

DLGDP	0	0.12%	1.38%	9.65%	0.08%	88.77%
	1	0.72%	3.55%	12.05%	0.44%	83.24%
	6	5.01%	23.04%	7.59%	4.33%	60.03%
	12	7.19%	3.00%	9.55%	6.94%	73.31%

(Source: calculated by the author)

Table 11 presents the forecast error variance decomposition analysis for Singapore. Reinforcing the results of the impulse response analysis, and except due to its own shocks, the country's inflation rate generally shows a negligible response to shocks in any other variables. Moreover, an innovation in the inflation rate would also account for the smallest percentage of the error variance of all other variables. This indicated that Singapore's inflation rates are unlikely to influence or be influenced by other variables.

The forecast error variance of Thai stock index return is mainly attributable to own shocks, and after six steps ahead, the behavior has settled around 64% for more than three years (Table 12).

After one horizon, shocks to the changes in the exchange rate variable (DER) causes the second greatest percentage of the error variance of the changes in the domestic interest rate variable (DIR), after its own shocks. Similarly, shocks to DIR also result in the second largest percentage of the forecast error variance of DER, after its own shocks, in the same period.

Table 11. Generalized Forecast Error Variance Decomposition Analysis for Singapore

Innovation	**Step**	**Forecast Error Variance on :**				
In:	**Ahead**	**DLSP**	**DER**	**DIR**	**DLCPI**	**DLGDP**
DLSP	0	68.61%	12.19%	15.41%	1.19%	2.60%
	1	64.50%	11.65%	15.94%	5.42%	2.49%
	6	56.56%	16.81%	16.09%	6.58%	3.95%
	12	35.14%	10.46%	10.06%	41.86%	2.47%
DER	0	9.93%	55.93%	15.65%	0.06%	18.42%
	1	11.22%	54.78%	15.66%	0.19%	18.15%
	6	10.43%	52.99%	17.96%	2.08%	16.54%
	12	10.42%	52.75%	18.20%	2.09%	16.54%
DIR	0	13.78%	17.17%	61.36%	0.13%	7.56%
	1	13.81%	16.66%	60.36%	1.09%	8.07%
	6	13.27%	16.87%	58.61%	2.05%	9.20%
	12	13.31%	17.02%	58.49%	2.06%	9.11%
DLCPI	0	1.68%	0.11%	0.21%	96.49%	1.51%
	1	1.66%	1.10%	0.40%	93.01%	3.82%
	6	4.24%	3.32%	0.75%	87.13%	4.57%

	12	3.25%	25.83%	0.61%	66.79%	3.52%
DLGDP	0	2.52%	21.87%	8.18%	1.04%	66.39%
	1	7.50%	19.89%	10.81%	1.52%	60.28%
	6	7.50%	18.77%	11.09%	5.72%	56.92%
	12	7.53%	18.71%	11.17%	5.74%	56.85%

(Source: calculated by the author)

Table 12. Generalized Forecast Error Variance Decomposition Analysis for Thailand

Innovation in:	Step Ahead	Forecast Error Variance on : DLSP	DER	DIR	DLCPI	DLGDP
DLSP	0	76.86%	17.99%	4.04%	0.31%	0.81%
	1	73.40%	17.07%	3.86%	4.03%	1.64%
	6	64.62%	16.93%	7.17%	8.26%	3.02%
	12	64.60%	16.92%	7.17%	8.27%	3.04%
DER	0	17.11%	73.07%	5.81%	0.08%	3.93%
	1	15.32%	56.65%	22.25%	2.63%	3.15%
	6	11.34%	45.83%	20.24%	10.06%	12.53%
	12	11.34%	45.82%	20.24%	10.08%	12.53%
DIR	0	4.22%	6.39%	80.33%	5.79%	3.28%
	1	2.65%	19.62%	63.26%	4.39%	10.08%
	6	3.00%	21.51%	60.13%	5.86%	9.50%
	12	3.00%	21.51%	60.11%	5.87%	9.51%
DLCPI	0	0.36%	0.10%	6.45%	89.49%	3.60%
	1	1.90%	4.71%	5.77%	84.13%	3.49%
	6	1.90%	5.87%	8.24%	80.21%	3.78%
	12	1.90%	5.88%	8.23%	80.20%	3.78%
DLGDP	0	0.92%	4.70%	3.56%	3.51%	87.31%
	1	5.60%	5.63%	19.54%	4.15%	65.09%
	6	6.22%	5.58%	18.95%	4.45%	64.80%
	12	6.22%	5.59%	18.96%	4.45%	64.78%

(Source : calculated by the author)

CONCLUSION

The objective of this study was to observe the short-term dynamic interaction between stock prices and macroeconomic factors in five ASEAN countries, namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand, with particular attention to the 1997 Asian financial crisis and the period onwards. Since there is no co integrating relationships were found between stock price returns (measured

by the first differences of the logs) and macroeconomic factors in any of the five ASEAN countries, accounting innovation analysis was implemented based on VAR analytical framework.

Impulse response analysis indicates that shocks to the changes in the domestic interest rate and the inflation rate result in a greater contemporaneous reaction by the stock index returns than shocks to the changes in the domestic exchange rate and the GDP growth in Indonesia. The stock index return responses to a shock in the domestic exchange rate last less than three years in all of the countries, except Indonesia. Shocks to the stock index returns result in significant responses for over three years by the changes in the domestic interest rates in Indonesia and Malaysia, but less than three years in the other countries. Moreover, GDP growth shows the shortest response to shocks in any other variable in Thailand and Indonesia. Meanwhile all of the countries' inflation rates, except for that of Indonesia, generally respond to shocks in other variables for less than one year. The forecast error variance decomposition results reinforce the above findings.

REFERENCES

Abdullah, D.A. and Hayworth, S.C. (1993), "Macroeconometrics of Stock Price Fluctuations", *Quarterly Journal of Business and Economics*, 32(1): 46-63.

Arestis, P., Demetriades, P.O. and Luintel, K.B. (2001), "Financial Development and Economic Growth: The Role of Stock Markets", *Journal of Money, Credit, and Banking*, 33(1): 16-41.

Beenstock, M. and Chan, K.F. (1998), "Economic Forces in the London Stock Market", *Oxford Bulletin of Economics and Statistics*, 50 (1): 27-39.

Beng, G.W. and Ying, S.L. (2000), 'Exchange Rate and Interest Rate Differential: the Case of the Malaysian Ringgit/US Dollar', *Applied Economics Letters*, 7: 95-97.

Brooks, C. (2002), *Introductory Econometrics for Finance*. Cambrige University Press: Cambrige.

Capital Market Supervisory Agency (BAPEPAM) (2000), "Capital Market Statistic: ASEAN Stock Markets Indices", http://www.bapepam.go.id/feature/statistik/des2000_3.pdf, Visited, May 2004.

Capital Market Supervisory Agency (BAPEPAM) (2001), "Capital Market Statistic: ASEAN Stock Markets Indices", http://www.bapepam.go.id/feature/statistik/des2001_4.pdf, Visited, May 2004.

Capital Market Supervisory Agency (BAPEPAM) (2002), "Capital Market Statistic: ASEAN Stock Markets Indices", http://www.bapepam.go.id/feature/statistik/des2002_4.pdf Visited, May 2004.

Capital Market Supervisory Agency (BAPEPAM) (1999) "Capital Market Statistic: ASEAN Stock Markets Indices", http://www.bapepam.go.id/feature/statistik/des_5.pdf, Visited, May 2004.

Capital Market Supervisory Agency (BAPEPAM) (2003), "Capital Market Statistic: ASEAN Stock Markets Indices. http://www.bapepam.go.id/feature/statistik/des2003_5.pdf . Visited, May 2004.

Central Bank of Republic Indonesia (2004), GDP by Sector at Current Price. http://www.bi.go.id/bank_Indonesia_english/main/statistic/data.asp?head=96, Visited, May 2004.

Chatrath, A., Ramchander, S. and Song, F. (1997), "Stock Price, Inflation, and Output: Evidence from India", *Applied Financial Economics*, 7: 439-445.

Chow, G.C. and Lin, A. (1971), "Best Linear Unbiased Interpolation, Distribution, and Extrapolation of Time Series by Related Series", *The Review of Economics and Statistics*, 53(4): 372-375.

Dekker, A., Sen, K. and Young, M. (2001), "Equity Market Linkage in the Asia Pacific Region: A Comparison of the Orthogonalized and Generalized VAR Approaches", *Global Finance Journal*, 12:1-33.

Department of Foreign Affair and Trade of Australia (DFAT) (1999), *Asia's Financial Markets: Capitalising on Reform*, East Asia Analytical Unit, Canberra.

Enders, W. (2004), *Applied Econometric Time Series*, Second Edition. John Wiley & Sons: USA.

Eun, C.S. and Resnick, Bruce G. (2004), *International Financial Management*, Third Edition. McGraw-Hill: New York.

Fama, E.F. (1981), "Stock Returns, Real Activity, Inflation, and Money", *American Economic Review*, 71: 545-65

Fisher, S. (1998), "The Asian Crisis: A View from the IMF", Papers presented to the Midwinter Conference of the Bankers' Association for Foreign Trade: Washington.

Giovanini, A. and Jorion, P. (March 1987), "Interest Rate and Risk Premia in the Stock Market and in the Foreign Exchange Market", *Journal of International Money and Finance*, 107-23.

Ibrahim, M.H. (2000), "Cointegration and Granger Causality Tests of Stock Price and Exchange Rate Interactions in Malaysia", *ASEAN Economic Bulletin*, 17(1): 36-47.

International Monetary Fund (2004), *International Financial Statistic (IFS) Online*. Washington DC.

Jackson, J. and McIver, R. (2004), *Macroeconomics Seventh Edition*. McGraw-Hill: Australia.

Johnson, R. and Soenen, L. (1998), "Stock Prices and Exchange Rates: Empirical Evidence from the Pacific Basin", *Journal of Asian Business*, 14(2): 1-18.

Kaul, G. and Seyhun, H. N. (1990), "Relative Price Variability, Real Shocks, and the Stock Market", *The Journal of Finance*, XLV (2): 479-96.

Kniest, P., Lee, J. and Burgess, J. (1998). *Introduction to Macroeconomics*. Macmillan: South Yara-Australia

Krugman, P.R. and Obstfeld, M. (2003), *International Economics: Theory & Policy*, 6th Edition, The Addison-Wesley: Boston.

Leonard, D. C. and Solt, M.E. (1987), "Stock Market Signals of Changes in Expected Inflation", *The Journal of Financial Research*, X(1):57-63.

Mahdavi, S. and Sohrabian, A. (1991), "The Link between The Rate of Growth of Stock Prices and the Rate of Growth of GNP in the United States: A Granger-causality Test", *The American Economist*, 35(2): 41-48.

Mauro, P. (2003), "Stock Returns and Output Growth in Emerging and Advanced Economies", *Journal of Development Economics*, 71: 129-53.

Morley, B. and Pentecost, E.J. (2000), "Common Trends and Cycles in G-7 Countries Exchange Rates and Stock Prices", *Applied Economics Letters*, 7: 7-10.

Mukherjee, T.K. and Naka, A. (1995), "Dynamic Relation Between Macroeconomic Variables and the Japanese Stock Market: an Application of a Vector Error Correction Model", *Journal of Financial Research*, 18(2): 223-37.

National Statistical Coordination Board (NSCB) (2003), *GNP and GDP 2000-4th Quarter 2003*. http://www.nscb.gov.ph/secstat/d_accounts.asp Visited, May 2004.

Pesaran, M.H. and Pesaran, B. (1997), *Working with Microfit 4.0: Interactive Econometric Analysis, Window Version*. Oxford University Press: Oxford.

Pilbeam, K. (1998), *International Finance, Second Edition*. Palgrave: New York.

Radelet, S. and Sachs, J. (1999a), "What Have We Learned, So Far, from the Asian Financial Crisis?", *CAER II Discussion Paper No. 37*, Harvard Institute for International Development, 1-23.

Radelet, S. and Sachs, J. (1999b), "The Second Year of the Asian Financial Crisis: Country Strategies and Prospects for Recovery", *CAER II Discussion Paper No. 60*, Harvard Institute for International Development, 1-42.

Randal, M.R. and Suk, D.Y. (1999), "Inflationary Concerns and Stock Returns: an Alternative Perspective", *American Business Review*, 17 (1): 123-126.

Rousseau, P.L. and Wachtel, P. (2000), "Equity Markets and Growth: Cross-country Evidence on Timing and Outcomes", 1980-1995', *Journal of Banking and Finance*, 24: 1933-1957.

Saunders, A. and Tress, R. B. (1981), 'Inflation and Stock Market Returns: Some Australian Evidence", *Economic Record*, 57 (156): 58-66.

Shapiro, Alan C. (2002) *Foundation of Multinational Financial Management*, 4th Edition, John Wiley & Sons: New York.

Solnik, B. (1987), "Using Financial Prices to Test Exchange Rate Models: a Note", *Journal of Finance*, 42(1):141-9

Statistics Singapore (2004) *GDP by Industry*, http://www.singstat.gov.sg/keystats/mgstats/ess/aesa11.pdf. Visited, May 2004.

Stock, J.H. and Watson, M.W. (1990), "Business Cycle Properties of Selected U.S. Economic Time Series 1959-1988", *NBER Working Paper 3376*.

Stock, J.H. and Watson, M.W. (1998), "Business Cycle Fluctuation in U.S. Macroeconomic Time Series", *NBER Working Paper 6528*.

Taylor, J.B. and Moosa, I. (2000), *Macroeconomics: Australian Edition*, John Wiley and Sons: Brisbane.

Tongzon, J.L. (2002), *The Economies of Southeast Asia 2sd Edition: Before and After the Crisis*. Edward Elgar Publishing: Cheltenham.

Wongbangpo, P. and Sharma, S.C. (2002), "Stock Market and Macroeconomic Fundamental Dynamic Interactions: ASEAN-5 Countries", *Journal of Asian Economics*, 13: 27-51.

Yang, J., Kolari, J.W. and Min, I. (2003), "Stock Market Integration and Financial Crises: the Case of Asia", *Applied Financial Economics*, 13: 477-486.